



Heat exchanger DLLs & GUIs for AHU-Software

With the HES applications, namely **air heaters, air coolers, condensers, injection evaporators and in the future also several heat recovery systems**, not only fin coil heat exchangers can be calculated, but also various geometries can be compared according to criteria such as price, weight, content, installation length, pressure drop.

The requirements of the customers were that the presentation (GUI = Graphical User Interface) was the same as in the Excel-based applications, which are used standalone. This makes it unnecessary to rethink how to use it.

Furthermore, our neutral GUIs ensure, that you have exactly the same possibilities, as in the EXE, which is given away free of charge for use as a standalone application, when you buy the DLL and GUI. The EXE calculates up to 40 different fin coil heat exchanger geometries in less than 1 second. Our neutral EXE and GUI support 6 languages, namely **German, English, French, Italian, Russian, Spain**. The integration of other languages is possible at the customer's request, but would have to be borne by the customer in terms of costs.

If a potential customer would only purchase our neutral DLL for the calculation of the fin coil heat exchangers for currently CHF 2,400 and want to create the GUI with the same range of functions himself, he would have to reckon with 2 to 3 months of programming work.

From this point of view, our price for the GUI of currently also CHF 2,400 can be classified as peanuts.

Frage an meinen Programmierer

Ein Kunde fragt, ob es richtig ist, wenn er die DLL und die GUIDLL kauft, dass er dann die gleichen Optionen wie in der EXE hat, zum Beispiel das Ausdrucken des Ergebnisses.

Das ist natürlich richtig!

- 1. Heater.dll: Besteht aus dem SW-Modell, den Daten und dem Berechnungsverfahren.**
- 2. HeaterGUI.dll: Nutzt Heater.dll und seine Daten zur Darstellung der Ein-/Ausgabedaten und aller Ausgabe-funktionen, inklusive Drucken, PDF, Kopieren, Öffnen, Speichern.**
- 3. Heater.exe: Ruft einfach HeaterGUI.dll auf und hat die gleiche Ansicht und volle Funktionalität.**

Answer from my programmer

A customer asks whether it is correct, if he buys the DLL and the GUIDLL, that he then has the same options as in the EXE, for example printing the result.

Thats, of course, correct!

- 1. Heater.dll: Consist the software model, data and calculation procedure.**
- 2. HeaterGUI.dll: Use Heater.dll and its data to represent the input/output parameters and all output functions, inclusive print, pdf, copy, open, save.**
- 3. Heater.exe: Just calls HeaterGUI.dll and has the same view and full functionality.**

The objection that manufacturers of fin coil heat exchangers would give away DLLs free of charge, if they have them at all and a type examination by the TÜV is questionable, is of course true out of self-interest, as they want to sell their own products with reduced effort.

However, this must be countered by the fact, that such dozens of built-in DLL have far too many differences in capacity and pressure drop and their different handling is far too complex. For this reason, several manufacturers of air conditioning units have already deleted all these different DLL and replaced them with our neutral DLL and GUI.

Example of the CCSF heat recovery system, with a focus on cooling and dehumidification in summer.

The following table in the software allows 40 different geometries for the fin coil heat exchangers, with all red values being customizable inputs. Smooth and embossed fins can be calculated, whereby in the case of embossed fins such transverse or longitudinal to the air direction are possible. Round and oval tubes are supported.

CC-System: Comparison of different calculations Software by www.zcs.ch

| No. | Selection | S1 | S2 | DA | DA | SA | S | F | Ld | Lc | Lw | Lp | P | W | V | RT | LT | Ap | Agent | Tic | |
|-----|-----------|--------|--------|--------|--------|-------|----|----|-------|-------|--------|----|----|-------|------|-----|------|-----|-------|--------|------|
| | | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | mm | kg | l | mm | mm | Pa | Pa | Pa | |
| 1 | A | 40.000 | 35.000 | 15.400 | 15.400 | 0.350 | 1 | 1 | 0.200 | 0.500 | 33.000 | 3 | 7 | 37347 | 2336 | 926 | 2160 | 2.5 | 465 | 370.31 | 3.38 |
| 2 | B | 37.000 | 32.000 | 14.000 | 14.000 | 0.350 | 1 | 1 | 0.200 | 1.200 | 30.478 | 4 | 9 | 34613 | 2139 | 668 | 1960 | 2.6 | 809 | 351.05 | 8.21 |
| 3 | C | 32.000 | 27.713 | 12.400 | 12.400 | 0.350 | 1 | 1 | 0.200 | 1.000 | 25.713 | 3 | 7 | | | | | | | | |
| 4 | D | 30.000 | 25.681 | 12.400 | 12.400 | 0.350 | 1 | 1 | 0.200 | 0.500 | 23.681 | 3 | 7 | | | | | | | | |
| 5 | E | 25.000 | 21.651 | 10.400 | 10.400 | 0.350 | 1 | 1 | 0.200 | 0.500 | 19.651 | 3 | 7 | 38441 | 1912 | 692 | 1620 | 2.7 | 439 | 400.68 | 8.28 |
| 6 | | 50.000 | 50.000 | 15.400 | 15.400 | 0.350 | 2 | 1 | 0.200 | 0.500 | 48.000 | 3 | 7 | 44371 | 3247 | 854 | 3260 | 2.7 | 389 | 397.48 | 8.98 |
| 7 | | 35.000 | 35.000 | 12.400 | 12.400 | 0.350 | 2 | 1 | 0.200 | 0.500 | 33.000 | 3 | 7 | 39811 | 2495 | 720 | 2220 | 2.5 | 368 | 396.31 | 7.48 |
| 8 | | 32.000 | 32.000 | 12.400 | 12.400 | 0.350 | 2 | 1 | 0.200 | 1.000 | 30.000 | 3 | 7 | | | | | | | | |
| 9 | | 30.000 | 30.000 | 12.400 | 12.400 | 0.350 | 2 | 1 | 0.200 | 1.000 | 28.000 | 3 | 7 | | | | | | | | |
| 10 | | 25.000 | 25.000 | 10.400 | 10.400 | 0.350 | 2 | 1 | 0.200 | 1.000 | 23.000 | 3 | 7 | | | | | | | | |
| 11 | | 40.000 | 34.641 | 16.400 | 16.400 | 0.350 | 1 | 2 | 0.200 | 2.600 | 40.000 | 4 | 10 | | | | | | | | |
| 12 | | 35.000 | 30.311 | 12.400 | 12.400 | 0.350 | 1 | 2 | 0.200 | 2.600 | 35.000 | 4 | 10 | | | | | | | | |
| 13 | | 33.333 | 28.867 | 12.400 | 12.400 | 0.350 | 1 | 2 | 0.200 | 2.600 | 33.333 | 4 | 10 | 32447 | 1942 | 823 | 1660 | 2.6 | 324 | 390.73 | 6.88 |
| 14 | | 30.000 | 25.981 | 12.450 | 12.450 | 0.350 | 1 | 2 | 0.200 | 2.600 | 30.000 | 4 | 10 | 31543 | 1803 | 836 | 1470 | 2.5 | 343 | 422.84 | 7.70 |
| 15 | | 25.000 | 21.651 | 10.400 | 10.400 | 0.350 | 1 | 2 | 0.200 | 2.600 | 25.000 | 4 | 10 | | | | | | | | |
| 16 | | 40.000 | 40.000 | 16.400 | 16.400 | 0.350 | 2 | 2 | 0.200 | 2.600 | 40.000 | 4 | 10 | | | | | | | | |
| 17 | | 35.000 | 35.000 | 13.100 | 13.100 | 0.350 | 2 | 2 | 0.200 | 2.600 | 35.000 | 4 | 10 | 36150 | 2308 | 683 | 1970 | 2.6 | 274 | 372.85 | 5.68 |
| 18 | | 32.000 | 32.000 | 12.400 | 12.400 | 0.350 | 2 | 2 | 0.200 | 2.600 | 32.000 | 4 | 10 | | | | | | | | |
| 19 | | 30.000 | 30.000 | 12.400 | 12.400 | 0.350 | 2 | 2 | 0.200 | 2.600 | 30.000 | 4 | 10 | | | | | | | | |
| 20 | | 25.000 | 25.000 | 10.400 | 10.400 | 0.350 | 2 | 2 | 0.200 | 2.600 | 25.000 | 4 | 10 | | | | | | | | |
| 21 | | 40.000 | 34.641 | 20.400 | 20.400 | 0.350 | 1 | 1 | 0.200 | 1.000 | 32.841 | 3 | 7 | | | | | | | | |
| 22 | | 35.000 | 30.311 | 16.400 | 16.400 | 0.350 | 1 | 1 | 0.200 | 1.000 | 28.311 | 3 | 7 | | | | | | | | |
| 23 | | 32.000 | 27.713 | 16.400 | 16.400 | 0.350 | 1 | 1 | 0.200 | 1.000 | 25.713 | 3 | 7 | | | | | | | | |
| 24 | | 30.000 | 25.681 | 16.400 | 16.400 | 0.350 | 1 | 1 | 0.200 | 1.000 | 23.681 | 3 | 7 | | | | | | | | |
| 25 | | 25.000 | 21.651 | 14.400 | 14.400 | 0.350 | 1 | 1 | 0.200 | 1.000 | 19.651 | 3 | 7 | | | | | | | | |
| 26 | | 40.000 | 40.000 | 20.400 | 20.400 | 0.350 | 2 | 1 | 0.200 | 1.000 | 38.000 | 3 | 7 | | | | | | | | |
| 27 | | 35.000 | 35.000 | 16.400 | 16.400 | 0.350 | 2 | 1 | 0.200 | 1.000 | 33.000 | 3 | 7 | | | | | | | | |
| 28 | | 32.000 | 32.000 | 16.400 | 16.400 | 0.350 | 2 | 1 | 0.200 | 1.000 | 30.000 | 3 | 7 | | | | | | | | |
| 29 | | 30.000 | 30.000 | 16.400 | 16.400 | 0.350 | 2 | 1 | 0.200 | 1.000 | 28.000 | 3 | 7 | | | | | | | | |
| 30 | | 25.000 | 25.000 | 14.400 | 14.400 | 0.350 | 2 | 1 | 0.200 | 1.000 | 23.000 | 3 | 7 | | | | | | | | |
| 31 | | 40.000 | 34.641 | 20.400 | 20.400 | 0.350 | 1 | 2 | 0.200 | 2.600 | 40.000 | 4 | 10 | | | | | | | | |
| 32 | | 35.000 | 30.311 | 16.400 | 16.400 | 0.350 | 1 | 2 | 0.200 | 2.600 | 35.000 | 4 | 10 | | | | | | | | |
| 33 | | 32.000 | 27.713 | 16.400 | 16.400 | 0.350 | 1 | 2 | 0.200 | 2.600 | 32.000 | 4 | 10 | | | | | | | | |
| 34 | | 30.000 | 25.681 | 16.400 | 16.400 | 0.350 | 1 | 2 | 0.200 | 2.600 | 30.000 | 4 | 10 | | | | | | | | |
| 35 | | 25.000 | 21.651 | 14.400 | 14.400 | 0.350 | 1 | 2 | 0.200 | 2.600 | 25.000 | 4 | 10 | | | | | | | | |
| 36 | | 40.000 | 40.000 | 20.400 | 20.400 | 0.350 | 2 | 2 | 0.200 | 2.600 | 40.000 | 4 | 10 | | | | | | | | |
| 37 | | 35.000 | 35.000 | 16.400 | 16.400 | 0.350 | 2 | 2 | 0.200 | 2.600 | 35.000 | 4 | 10 | | | | | | | | |
| 38 | | 32.000 | 32.000 | 16.400 | 16.400 | 0.350 | 2 | 2 | 0.200 | 2.600 | 32.000 | 4 | 10 | | | | | | | | |
| 39 | | 30.000 | 30.000 | 16.400 | 16.400 | 0.350 | 2 | 2 | 0.200 | 2.600 | 30.000 | 4 | 10 | | | | | | | | |
| 40 | | 25.000 | 25.000 | 14.400 | 14.400 | 0.350 | 2 | 2 | 0.200 | 2.600 | 25.000 | 4 | 10 | | | | | | | | |

Factor TIC: It is important that all tube circuits (NC) receive the same amount of liquid. This is the only way to achieve optimum heat exchanger performance. This can only be achieved if the pressure loss in the tubes is significantly higher than in the collectors. We recommend a ratio > 2, which can be achieved by increasing the collector diameter.

Selection 1 (Default): All flow across to the corrugated fins, with a higher pressure drop and a higher fin surface like flat fins.

Selection 2 (Waves): All flow parallel to the corrugated fins, with a little higher pressure drop and a higher fin surface like flat fins.

Example:

- S1 = Tube interval on the height: 30.000 mm
- Lc = Corrugated fin region: 30.000 mm
- Ln = Corrugated fin height: 2.500 mm
- Lw = Number of waves: 4.000
- Ln = Number of fin crests: Ln=2(Lw+1): 30.000

$$f_1 = 0.7636 \rightarrow f_2 = (S_1 - L_c) + 2L_w \left(\frac{L_c(L_c - L_w)}{2L_w} + \left(\frac{L_w}{2L_w} \right)^2 + L_c^2 \right)$$

$f_1 = f_2$ extended: 38.024 mm

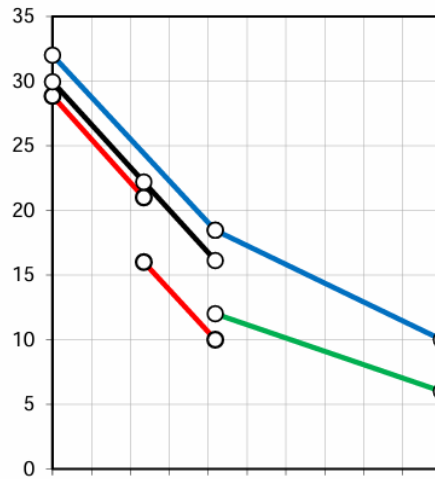
$f_1 = f_2$: 1.368

Example of the CCSF heat recovery system, with a focus on cooling and dehumidification in summer.

| CC-System in summer | | SACo1 | SACo2 | SAHe | RAHe |
|---------------------|----------------|----------|---------|---------|----------|
| Capacity | kW | 115.397 | 160.313 | 50.721 | 64.675 |
| Surface reserve | % | 1.284 | 1.388 | 0.209 | 1.571 |
| Present surface | m ² | 1413.845 | 473.511 | 177.112 | 1362.490 |
| Temp. | °C | 32.000 | 18.460 | 10.000 | 21.000 |
| Rel. humidity | % | 40.000 | 89.391 | 100.000 | 100.000 |
| Abs. humidity | g/kg | 11.860 | 11.860 | 7.631 | 15.619 |
| Temp. out | °C | 18.460 | 10.000 | 16.000 | 28.852 |
| Rel. humidity out | % | 89.391 | 100.000 | 67.620 | 62.675 |
| Abs. humidity out | g/kg | 11.860 | 7.631 | 7.631 | 15.619 |
| Velocity | m/s | 1.893 | 1.829 | 1.804 | 1.826 |
| Pressure drop | Pa | 134.402 | 63.454 | 22.473 | 122.244 |

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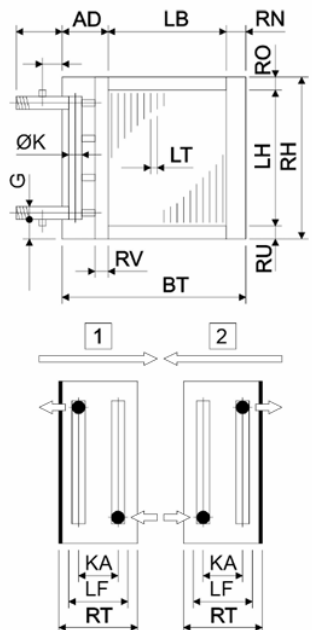
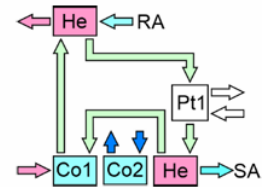
| Definition | | |
|-----------------------|-------------------|-----------|
| Height over sea level | m | 0.000 |
| Pressure | hPa | 1013.250 |
| Temp. | °C | 20.000 |
| Rel. humidity | % | 40.000 |
| Supply air | m ³ /h | 25000.000 |
| Return air | m ³ /h | 24000.000 |
| 25 V% Et.glycol | | |
| Temp. in | °C | 16.130 |
| Temp. out | °C | 29.950 |
| Volume flow | m ³ /h | 7.756 |
| Pressure drop total | kPa | 422.842 |
| Water | | SA-Co2 |
| Temp. in | °C | 6.000 |
| Temp. out | °C | 12.000 |
| Volume flow | m ³ /h | 22.934 |
| Pressure drop | kPa | 37.325 |



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| Technical data | | SACo1 | SACo2 | SAHe | RAHe |
|-----------------------------|-------|----------------|----------------|----------------|----------------|
| Tubes blank | Piece | 0 | 6 | 0 | 2 |
| Int. vent./drains | Piece | 7 | 0 | 1 | 7 |
| Tube rows on the depth | Piece | 16 | 6 | 4 | 16 |
| Tube rows on the height | Piece | 50 | 50 | 50 | 50 |
| Number of circuits (NC) | Piece | 20 | 49 | 20 | 19 |
| Volume | l | 234 | 104 | 64 | 234 |
| Weight | kg | 694 | 276 | 153 | 680 |
| Connections | G | 2" | 3" | 2" | 2" |
| Frame height | RH | 1560 | 1560 | 1560 | 1560 |
| Frame width | BT | 2710 | 2710 | 2710 | 2710 |
| Frame depth | RT | 510 | 250 | 200 | 510 |
| Finned height | LH | 1500 | 1500 | 1500 | 1500 |
| Finned width | LB | 2513 | 2497 | 2513 | 2513 |
| Frame on top | RO | 30 | 30 | 30 | 30 |
| Frame on bottom | RU | 30 | 30 | 30 | 30 |
| Frame in front | RV | 30 | 30 | 30 | 30 |
| Frame on back | RN | 53 | 53 | 53 | 53 |
| Collector covering | AD | 144 | 160 | 144 | 144 |
| Fin spacing | LT | 2.500 | 2.800 | 5.300 | 2.600 |
| Fin thickness | LD | 0.200 | 0.200 | 0.200 | 0.200 |
| Tube diameter | DA | 12.450 | 12.450 | 12.450 | 12.450 |
| Tube diameter | da | 12.450 | 12.450 | 12.450 | 12.450 |
| Tube thickness | S | 0.350 | 0.350 | 0.350 | 0.350 |
| Tube interval on the height | S1 | 30.000 | 30.000 | 30.000 | 30.000 |
| Tube interval on the depth | S2 | 25.981 | 25.981 | 25.981 | 25.981 |
| Tubes | --- | Cu | Cu | Cu | Cu |
| Tubes | --- | smooth | smooth | smooth | smooth |
| Tubes | --- | staggered | staggered | staggered | staggered |
| Tubes | Type | circular | circular | circular | circular |
| Collector | --- | 0.2 | Cu | Cu | Cu |
| Connections | --- | Rg7 | Rg7 | Rg7 | Rg7 |
| Fins | --- | Al | Al | Al | Al |
| Fins | --- | Wave structure | Wave structure | Wave structure | Wave structure |
| Frame | --- | AISI 304 | AISI 304 | AISI 304 | AISI 304 |
| Protection | --- | without | without | without | without |
| Protection | --- | --- | --- | --- | --- |
| Price | EUR | 11989.00 | 4889.00 | 2841.00 | 11824.00 |

Software by www.zcs.ch



Example of the CCSF heat recovery system in winter, where the focus is on preheating.

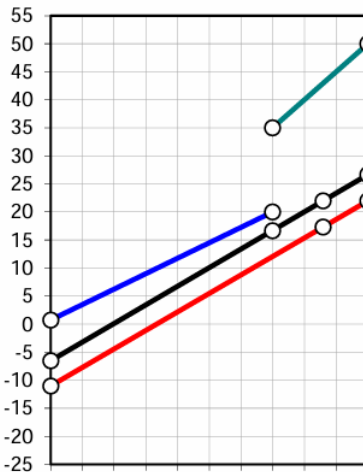
| CC-System in winter | | SAHe1 | SACo2 | SAHe2 | RACo |
|---------------------|----------------|----------|---------|---------|----------|
| Capacity | kW | 236.866 | | 38.867 | 192.774 |
| Surface reserve | % | 0.000 | | 0.118 | 0.240 |
| Present surface | m ² | 1413.845 | 473.511 | 177.112 | 1362.490 |
| Temp. in | °C | -11.000 | | 17.350 | 20.000 |
| Rel. humidity in | % | 90.000 | | 10.735 | 40.000 |
| Abs. humidity in | g/kg | 1.306 | | 1.306 | 5.784 |
| Temp. out | °C | 17.350 | | 22.000 | 0.755 |
| Rel. humidity out | % | 10.735 | | 8.049 | 99.807 |
| Abs. humidity out | g/kg | 1.306 | | 1.306 | 3.990 |
| Velocity | m/s | 1.724 | 1.724 | 1.827 | 1.708 |
| Pressure drop | Pa | 120.265 | 48.560 | 22.675 | 125.991 |

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| Definition | | | |
|-----------------------|-------------------|-----------|--|
| Height over sea level | m | 0.000 | |
| Pressure | hPa | 1013.250 | |
| Temp. | °C | 20.000 | |
| Rel. humidity | % | 40.000 | |
| Supply air | m ³ /h | 25000.000 | |
| Return air | m ³ /h | 24000.000 | |

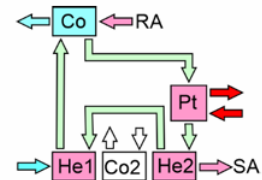


| 25 V% Et.glycol | | | |
|---------------------|-------------------|---------|--|
| Temp. in | °C | 26.673 | |
| Temp. out | °C | -6.505 | |
| Volume flow | m ³ /h | 7.756 | |
| Pressure drop total | kPa | 485.718 | |

| Water | | | |
|---------------|-------------------|-----|--|
| Temp. in | °C | --- | |
| Temp. out | °C | --- | |
| Volume flow | m ³ /h | --- | |
| Pressure drop | kPa | --- | |

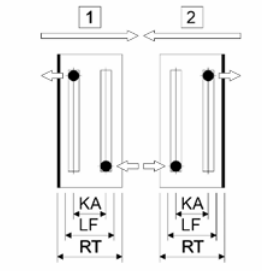
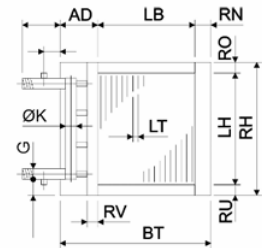
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Software by www.zcs.ch

| Technical data | | SA-He1 | SA-Co | SA-He2 | RA-Hy |
|-----------------------------|------------|-----------------|----------------|----------------|-----------------|
| Tubes blank | Piece | 0 | 6 | 0 | 2 |
| Int. vent./drains | Piece | 7 | 0 | 1 | 7 |
| Tube rows on the depth | Piece | 16 | 6 | 4 | 16 |
| Tube rows on the height | Piece | 50 | 50 | 50 | 50 |
| Number of circuits (NC) | Piece | 20 | 49 | 20 | 19 |
| Volume | l | 234 | 104 | 64 | 234 |
| Weight | kg | 694 | 276 | 153 | 680 |
| Connections | G | 2" | 3" | 2" | 2" |
| Frame height | RH | 1560 | 1560 | 1560 | 1560 |
| Frame width | BT | 2710 | 2710 | 2710 | 2710 |
| Frame depth | RT | 510 | 250 | 200 | 510 |
| Finned height | LH | 1500 | 1500 | 1500 | 1500 |
| Finned width | LB | 2513 | 2497 | 2513 | 2513 |
| Frame on top | RO | 30 | 30 | 30 | 30 |
| Frame on bottom | RU | 30 | 30 | 30 | 30 |
| Frame in front | RV | 30 | 30 | 30 | 30 |
| Frame on back | RN | 53 | 53 | 53 | 53 |
| Collector covering | AD | 144 | 160 | 144 | 144 |
| Fin spacing | LT | 2.500 | 2.800 | 5.300 | 2.600 |
| Fin thickness | LD | 0.200 | 0.200 | 0.200 | 0.200 |
| Tube diameter | DA | 12.450 | 12.450 | 12.450 | 12.450 |
| Tube diameter | da | 12.450 | 12.450 | 12.450 | 12.450 |
| Tube thickness | S | 0.350 | 0.350 | 0.350 | 0.350 |
| Tube interval on the height | S1 | 30.000 | 30.000 | 30.000 | 30.000 |
| Tube interval on the depth | S2 | 25.981 | 25.981 | 25.981 | 25.981 |
| Tubes | --- | Cu | Cu | Cu | Cu |
| Tubes | --- | smooth | smooth | smooth | smooth |
| Tubes | --- | staggered | staggered | staggered | staggered |
| Tubes | Type | circular | circular | circular | circular |
| Collector | --- | Cu | Cu | Cu | Cu |
| Connections | --- | Rg7 | Rg7 | Rg7 | Rg7 |
| Fins | --- | Al | Al | Al | Al |
| Fins | --- | Wave structure | Wave structure | Wave structure | Wave structure |
| Frame | --- | AISI 304 | AISI 304 | AISI 304 | AISI 304 |
| Protection | --- | without | without | without | without |
| Protection | --- | --- | --- | --- | --- |
| Price | EUR | 11989.00 | 4889.00 | 2841.00 | 11824.00 |



Heat exchanger (Pt)

| | | |
|----------|----|--------|
| Capacity | kW | 82.959 |
| in | °C | 50.000 |
| out | °C | 35.000 |
| in | °C | 16.691 |
| out | °C | 26.673 |

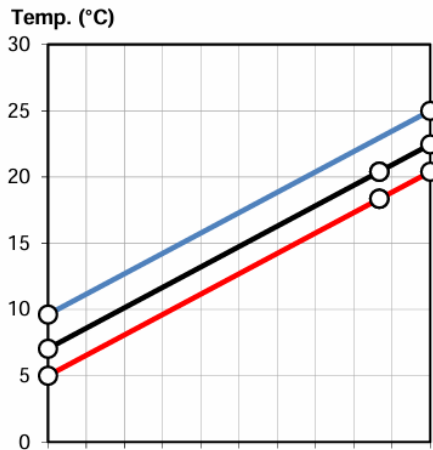
Example of the CCSF heat recovery system according to DIN EN 308, with the focus on temperature efficiency.

| CC-System in winter | | SAHe1308 | SACo2 | SAHe2308 | RACo308 |
|---------------------|----------------|----------|---------|----------|----------|
| Capacity | kW | 111.255 | | 17.036 | 128.290 |
| Surface reserve | % | 0.001 | | 0.288 | 0.419 |
| Present surface | m ² | 1413.845 | 473.511 | 177.112 | 1362.490 |
| Temp. in | °C | 5.000 | | 18.345 | 25.000 |
| Rel. humidity in | % | 0.000 | | 0.000 | 0.000 |
| Abs. humidity in | g/kg | 0.000 | | 0.000 | 0.000 |
| Temp. out | °C | 18.345 | | 20.388 | 9.615 |
| Rel. humidity out | % | 0.000 | | 0.000 | 0.000 |
| Abs. humidity out | g/kg | 0.000 | | 0.000 | 0.000 |
| Velocity | m/s | 1.773 | 1.773 | 1.821 | 1.809 |
| Pressure drop | Pa | 123.990 | 48.560 | 22.576 | 123.357 |

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Temp. efficiency % **76.940**

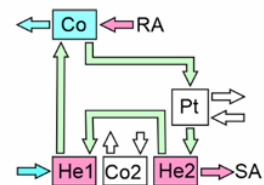


| Definition | |
|-----------------------|-----------------------------|
| Height over sea level | m 0.000 |
| Pressure | hPa 1013.250 |
| Temp. | °C 20.000 |
| Rel. humidity | % 40.000 |
| Supply air | m ³ /h 25000.000 |
| Return air | m ³ /h 25000.000 |

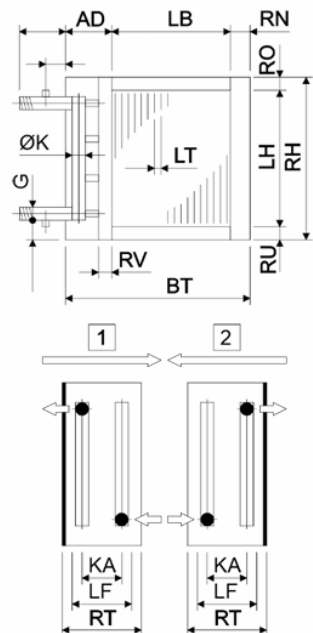
| 25 V% Et.glycol | |
|---------------------|-------------------------|
| Temp. in | °C 22.453 |
| Temp. out | °C 7.043 |
| Volume flow | m ³ /h 7.756 |
| Pressure drop total | kPa 446.885 |

| Technical data | | SA-He1 | SA-Co | SA-He2 | RA-Hy |
|-----------------------------|------------|-----------------|----------------|----------------|-----------------|
| Tubes blank | Piece | 0 | 6 | 0 | 2 |
| Int. vent./drains | Piece | 7 | 0 | 1 | 7 |
| Tube rows on the depth | Piece | 16 | 6 | 4 | 16 |
| Tube rows on the height | Piece | 50 | 50 | 50 | 50 |
| Number of circuits (NC) | Piece | 20 | 49 | 20 | 19 |
| Volume | l | 234 | 104 | 64 | 234 |
| Weight | kg | 694 | 276 | 153 | 680 |
| Connections | G | 2" | 3" | 2" | 2" |
| Frame height | RH | 1560 | 1560 | 1560 | 1560 |
| Frame width | BT | 2710 | 2710 | 2710 | 2710 |
| Frame depth | RT | 510 | 250 | 200 | 510 |
| Finned height | LH | 1500 | 1500 | 1500 | 1500 |
| Finned width | LB | 2513 | 2497 | 2513 | 2513 |
| Frame on top | RO | 30 | 30 | 30 | 30 |
| Frame on bottom | RU | 30 | 30 | 30 | 30 |
| Frame in front | RV | 30 | 30 | 30 | 30 |
| Frame on back | RN | 53 | 53 | 53 | 53 |
| Collector covering | AD | 144 | 160 | 144 | 144 |
| Fin spacing | LT | 2.500 | 2.800 | 5.300 | 2.600 |
| Fin thickness | LD | 0.200 | 0.200 | 0.200 | 0.200 |
| Tube diameter | DA | 12.450 | 12.450 | 12.450 | 12.450 |
| Tube diameter | da | 12.450 | 12.450 | 12.450 | 12.450 |
| Tube thickness | S | 0.350 | 0.350 | 0.350 | 0.350 |
| Tube interval on the height | S1 | 30.000 | 30.000 | 30.000 | 30.000 |
| Tube interval on the depth | S2 | 25.981 | 25.981 | 25.981 | 25.981 |
| Tubes | --- | Cu | Cu | Cu | Cu |
| Tubes | --- | smooth | smooth | smooth | smooth |
| Tubes | --- | staggered | staggered | staggered | staggered |
| Tubes | Type | circular | circular | circular | circular |
| Collector | --- | Cu | Cu | Cu | Cu |
| Connections | --- | Rg7 | Rg7 | Rg7 | Rg7 |
| Fins | --- | Al | Al | Al | Al |
| Fins | --- | Wave structure | Wave structure | Wave structure | Wave structure |
| Frame | --- | AISI 304 | AISI 304 | AISI 304 | AISI 304 |
| Protection | --- | without | without | without | without |
| Protection | --- | --- | --- | --- | --- |
| Price | EUR | 11989.00 | 4889.00 | 2841.00 | 11824.00 |

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Object
Position



Software by www.zcs.ch



Example of the CCSF heat recovery system, with a focus on cooling and dehumidification in summer.

Here, a planning engineer has demanded, that the exhaust air is not adiabatically pre-cooled in summer. This reduces the capacity output from the exhaust air from 64,675 kW to 32,815 kW, i.e. by half. He could just as well decouple the exhaust air from the intermediate carrier side, as the cooling requirement for the supply air is 277.322 kW, **which reduces the yield from the exhaust air from 23.46% to 11.83%.** **His ego does not allow this planning engineer to correct his tender.**

| CC-System in summer | | SACo1 | SACo2 | SAHe | RAHe |
|---------------------|----------------|----------|---------|---------|----------|
| Capacity | kW | 83.529 | 193.793 | 50.714 | 32.815 |
| Surface reserve | % | 0.841 | 5.894 | 77.877 | 0.775 |
| Present surface | m ² | 1413.845 | 473.511 | 177.112 | 1362.490 |
| Temp. | °C | 32.000 | 22.200 | 10.000 | 26.000 |
| Rel. humidity | % | 40.000 | 70.995 | 98.999 | 54.865 |
| Abs. humidity | g/kg | 11.860 | 11.860 | 7.554 | 11.500 |
| Temp. out | °C | 22.200 | 10.000 | 16.000 | 30.013 |
| Rel. humidity out | % | 70.995 | 98.999 | 66.944 | 43.450 |
| Abs. humidity out | g/kg | 11.860 | 7.554 | 7.554 | 11.500 |
| Velocity | m/s | 1.905 | 1.841 | 1.803 | 1.833 |
| Pressure drop | Pa | 135.337 | 60.223 | 22.468 | 122.416 |

| Definition | | |
|-----------------------|-------------------|-----------|
| Height over sea level | m | 0.000 |
| Pressure | hPa | 1013.250 |
| Temp. | °C | 20.000 |
| Rel. humidity | % | 40.000 |
| Supply air | m ³ /h | 25000.000 |
| Return air | m ³ /h | 24000.000 |

| 25 V% Et.glycol | | |
|---------------------|-------------------|---------|
| Temp. in | °C | 20.500 |
| Temp. out | °C | 30.560 |
| Volume flow | m ³ /h | 7.706 |
| Pressure drop total | kPa | 411.693 |

| Water SA-Co2 | | |
|---------------|-------------------|--------|
| Temp. in | °C | 6.000 |
| Temp. out | °C | 12.000 |
| Volume flow | m ³ /h | 27.719 |
| Pressure drop | kPa | 52.659 |

| Technical data | | SACo1 | SACo2 | SAHe | RAHe |
|-----------------------------|-------|----------------|----------------|----------------|----------------|
| Tubes blank | Piece | 0 | 6 | 0 | 2 |
| Int. vent./drains | Piece | 7 | 0 | 1 | 7 |
| Tube rows on the depth | Piece | 16 | 6 | 4 | 16 |
| Tube rows on the height | Piece | 50 | 50 | 50 | 50 |
| Number of circuits (NC) | Piece | 20 | 49 | 20 | 19 |
| Volume | l | 234 | 104 | 64 | 234 |
| Weight | kg | 694 | 276 | 153 | 680 |
| Connections | G | 2" | 3" | 2" | 2" |
| Frame height | RH | 1560 | 1560 | 1560 | 1560 |
| Frame width | BT | 2710 | 2710 | 2710 | 2710 |
| Frame depth | RT | 510 | 250 | 200 | 510 |
| Finned height | LH | 1500 | 1500 | 1500 | 1500 |
| Finned width | LB | 2513 | 2497 | 2513 | 2513 |
| Frame on top | RO | 30 | 30 | 30 | 30 |
| Frame on bottom | RU | 30 | 30 | 30 | 30 |
| Frame in front | RV | 30 | 30 | 30 | 30 |
| Frame on back | RN | 53 | 53 | 53 | 53 |
| Collector covering | AD | 144 | 160 | 144 | 144 |
| Fin spacing | LT | 2.500 | 2.800 | 5.300 | 2.600 |
| Fin thickness | LD | 0.200 | 0.200 | 0.200 | 0.200 |
| Tube diameter | DA | 12.450 | 12.450 | 12.450 | 12.450 |
| Tube diameter | da | 12.450 | 12.450 | 12.450 | 12.450 |
| Tube thickness | S | 0.350 | 0.350 | 0.350 | 0.350 |
| Tube interval on the height | S1 | 30.000 | 30.000 | 30.000 | 30.000 |
| Tube interval on the depth | S2 | 25.981 | 25.981 | 25.981 | 25.981 |
| Tubes | --- | Cu | Cu | Cu | Cu |
| Tubes | --- | smooth | smooth | smooth | smooth |
| Tubes | --- | staggered | staggered | staggered | staggered |
| Tubes | Type | circular | circular | circular | circular |
| Collector | --- | 0.2 | Cu | Cu | Cu |
| Connections | --- | Rg7 | Rg7 | Rg7 | Rg7 |
| Fins | --- | Al | Al | Al | Al |
| Fins | --- | Wave structure | Wave structure | Wave structure | Wave structure |
| Frame | --- | AISI 304 | AISI 304 | AISI 304 | AISI 304 |
| Protection | --- | without | without | without | without |
| Protection | --- | --- | --- | --- | --- |
| Price | EUR | 11989.00 | 4889.00 | 2841.00 | 11824.00 |

Software by www.zcs.ch

Company
Branch
Street
Country / ZIP / City
Phone: xxxxxxxxxx
Fax: xxxxxxxxxx
E-Mail
Homepage
12.5.2024
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Position

In total, there are said to be about 40 manufacturers of air conditioning units in German-speaking countries, whereby **a maximum of 10 companies are likely to fall** under the predicate of well-known. Our DLLs and GUIs are **not free of charge**, as they can be used to calculate and, above all, compare all the fin coil heat exchanger geometries offered on the market.

However, the prerequisite is that these manufacturers of air conditioners **have independently developed higher-level software** for the design of their air conditioning units and do not use narrow-gauge applications from software companies such as www.gj-isc.it, www.divid.se, www.unilab.eu.

There is supposed to be **too much bullshit** in it, such as dozens of DLLs for fin coil heat exchangers with totally unreasonable differences of up to 50% in terms of performance and pressure drop.

You could just as well use a divining rod!

And finally, some news from the big wide world and small-minded Switzerland.

Russia and China, 2 superpowers, are joining forces against the West in **the proxy war** in Ukraine.

Since 2014, Vladimir Putin has been getting what **he wants in Ukraine**.

Vladimir Putin is internationally advertised as a war criminal by **arrest warrant**, which does not interest governments in China, Serbia, Hungary, etc. at all.



And what are the US, the EU and NATO doing? Ukraine is being helped only **half-heartedly and belatedly**.

And the brakes are the Republicans in the USA, above all Donald Trump, and Germany with the **hesitant Olaf Scholz**.

Not to mention France with Emmanuel Macron, who **plays Napoleon** and only utters stupid sayings.



And what is Switzerland doing? Once again, they are playing the pseudo-neutral mediator with tens of millions at the expense of taxpayers to a so-called **high-level** conference on peace in Ukraine, where the adversary Russia is not invited and its ally China does not participate.

High-level? Drinking, eating and whoring at the expense of the taxpayers.

